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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,874	KOIZUMI, HIROKAZU	
	Examiner	**Art Unit**	
	KATRINA FUJITA	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 09 June 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-69 is/are pending in the application.

4a) Of the above claim(s) 33,66 and 69 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-32,34-65,67 and 68 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 February 2005 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 02/25/2005.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 33, 66 and 69 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 09, 2008.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so

as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because it contains reference numerals from the drawings. Correction is required. See MPEP § 608.01(b).

5. The disclosure is objected to because of the following informalities:

On page 36, line 5, “sate” should be -- state --.

Appropriate correction is required.

Claim Objections

6. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

7. Claims 3, 4 and 30 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Claim 3 lacks antecedent basis for “the object-zone information” in line 3. The following will be assumed for examination purposes: -- ~~the~~ object-zone information --.

Claim 3 lacks antecedent basis for “the decision results” in line 10. The following will be assumed for examination purposes: -- ~~the~~ decision results --.

Claim 4 lacks antecedent basis for “the first zone-correspondence information” in line 6. The following will be assumed for examination purposes: -- ~~the~~ first zone-correspondence information --.

Claim 4 recites “zone characteristic quantities and object characteristic quantities” in line 9. It is unclear whether this is intended to be the same as or different from the “zone characteristic quantities and object characteristic quantities” in line 8 of claim 3. The following will be assumed for examination purposes -- <u>the</u> zone characteristic quantities and <u>the</u> object characteristic quantities --.

Claim 30 lacks antecedent basis for “the degrees of combined similarity” in line 1. The following will be assumed for examination purposes: -- ~~the~~ degrees of combined similarity --.

Claim 30 lacks antecedent basis for “the sets of the objects and object zones”. The following will be assumed for examination purposes: -- ~~the~~ sets of the objects and object zones --.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO “Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility” (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

9. Claims 67 and 68 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 67 and 68 define a computer program embodying functional descriptive material. However, the claims do not define a computer-readable medium or computer-readable memory and is thus non-statutory for that reason (i.e., “When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized” – Guidelines Annex IV).

The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on “computer-readable medium” or equivalent; assuming the specification does NOT define the computer readable medium as a “signal”, “carrier wave”, or “transmission medium” which are deemed non-statutory (refer to “note” below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

A “signal” (or equivalent) embodying functional descriptive material is neither a process nor a product (i.e., a tangible “thing”) and therefore does not fall within one of the four statutory classes of § 101. Rather, “signal” is a form of energy, in the absence of any physical structure or tangible material.

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a “signal”, the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a “signal”, “carrier wave”, or “transmission medium”, the examiner suggests amending the claim to *include* the disclosed tangible computer readable media, while at the same time *excluding* the intangible media such as signals, carrier waves, etc.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-32, 34-65, 67 and 68 are rejected under 35 U.S.C. 102(b) as being anticipated by Crabtree et al. (US 6,185,314).

Regarding **claim 1**, Crabtree et al. discloses an object-tracking device for tracking an object based on image information ("system and method for determining whether image regions correspond to objects to be tracked in a scene, such as persons" at col. 1, line 40), comprising:

a characteristic-quantity synthesizing means adapted to synthesize characteristic quantities of objects representative of characteristic quantities of respective objects included in said image information for generating synthesized characteristic quantities (figure 2, numeral 600, in conjunction with 500; "model matcher generates at least one real-world feature for each region cluster, and then compares the at least one real-world feature for each region cluster with real-world feature model (statistical) information" at col. 16, line 14); and

a correspondence-establishing means (figure 2, numeral 300; “function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for establishing correspondences between object zones and objects on the basis of degrees of similarity between characteristic quantities of said object zones and said synthesized characteristic quantities, wherein said object zones refer to the zones that are extracted from said image information and include the objects of interest (“invoked to evaluate the degree of correspondence between an object extracted from the current frame and all objects from the previous frame” at col. 8, line 16).

Regarding **claim 2**, Crabtree et al. discloses a device wherein said characteristic-quantity synthesizing means is adapted to synthesize characteristic quantities for each of all required combinations of a plurality of objects to generate said synthesized characteristic quantities (“model matcher generates at least one real-world feature for each region cluster, and then compares the at least one real-world feature for each region cluster with real-world feature model (statistical) information” at col. 16, line 14), and

said correspondence-establishing means establishes correspondences between objects and object zones through comparing each of said synthesized characteristic quantities generated by said characteristic-quantity synthesizing means and zone characteristic quantities representative of the characteristic quantities of object zones

(see equation at step 3, in col. 8, line 28; “determines the best set of region clusters to retain” at col. 8, line 44).

Regarding **claim 3**, Crabtree et al. discloses a device provided with:

an object-zone extracting means (figure 2, numeral 210; “function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for extracting said object zones from said image information and providing object-zone information that includes the image information about said object zones (“extracts regions from the video frames that likely correspond to objects to be tracked or identified in the scene” at col. 5, line 20),

a state-of-tracking deciding means (figure 2, numeral 700; “function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for deciding the states of tracking of individual objects or object zones, wherein said state-of-tracking means relative positions of each object with respect to other objects (“split/merge resolver 700 uses an orthogonal feature set to the region corresponder 500, and is tunes to resolve the splitting and merging of objects" at col. 10, line 27), and

a characteristic-quantity generating means (figure 2, numeral 900; “function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for generating said zone characteristic quantities and object

characteristic quantities through the use of said image information, said object-zone information and decision results effected by said state-of-tracking deciding means, wherein said characteristic-quantity synthesizing means generates synthesized characteristic quantities through the use of said object characteristic quantities and the decision results effected by said state-of-tracking deciding means ("In order to track objects while merged, the merge transition stage 910 of the merge corresponder 900 is invoked given the set of region clusters in the OCG tracks prior to the merge and the region cluster creating the merge" at col. 15, line 1; "split transition phase 930 of the merge corresponder 900 is invoked given the set of region clusters in the new OCG tracks, that is the set of region clusters after the split" at col. 15, line 26).

Regarding **claim 4**, Crabtree et al. discloses a device wherein said state-of-tracking deciding means decides the states of tracking of respective objects or object zones based on the object-zone information and the correspondence information that has been determined that indicates the corresponding relationship between the object zones and objects prior to the present ("correspondence between nodes in the current frame and nodes in the prior frame" at col. 9, line 29) to provide first zone-correspondence information that indicates the corresponding relationship among the object zones and objects and said states of tracking ('determining the confidences between the original region cluster and candidates" at col. 26, line 21),

said characteristic-quantity generating means generates the zone characteristic quantities and the object characteristic quantities based on the current image information, said object-zone information, said first zone-correspondence information

and said correspondence information that has been determined (‘merge corresponder 900 tracks objects through the merge condition by extracting more detailed features from the object before, during, and after the merge” at col. 28, line 34),

said characteristic-quantity synthesizing means generates synthesized characteristic quantities that serve as candidates to be placed in the corresponding relationship to individual object zones based on said object characteristic quantities and said first zone-correspondence information to provide synthesized characteristic-quantity information, wherein said synthesized characteristic-quantity information is the information that includes synthesized characteristic quantities and the corresponding relationship between the synthesized characteristic quantities and objects used for the generation of said synthesized characteristic quantities (“generates a confidence value for each region cluster region that implicitly represents the likelihood that the region cluster is a person…Region clusters, their real-world position and size, and associated confidence value are then used to insertion into the OCG” at col. 16, line 27), and

said correspondence-establishing means includes a correspondence-determining means that associates objects and object zones to place in the corresponding relationship based on said first zone-correspondence information, zone characteristic-quantity information that is the information indicative of said zone characteristic quantities and said synthesized characteristic-quantity information to provide said correspondence information that has been determined in the present time (“inputs to the region corresponder 500 are the image information for the current video frame, the region clusters generated by the OCGM 300 for the current video frame, region clusters

generated from the previous video frame, and predetermined parameters used for the correspondence methodology" at col. 19, line 15; "Some of the features may have been extracted by the region segmenter 210 during image segmentation, and others may have been extracted by the model matcher 600" at col. 19, line 33).

Regarding **claims 5 and 6**, Crabtree et al. discloses a device wherein said state of tracking includes at least one of or a combination of: a stand-alone state in which only a single object resides in an object zone (i.e. an unmerged, unsplit cluster that contains valid data that fits into the model of a person); a crossover state in which a plurality of objects correspond to a single object zone (“merge tracking” at col. 29, line 23); and a state of parting that is a transient state in which a single object zone is parted into a plurality of object zones (“split transition” at col. 30, line 19).

Regarding **claim 7**, Crabtree et al. discloses a device wherein said characteristic-quantity generating means

generates zone characteristic quantities, each including at least one of or one of combinations of a color histogram, area, image template and color histogram normalized with respect to said area, of the object zone (“an enhanced set of features, such as color histogram peaks, are extracted for each connected component in both the initial region cluster set and the merged region cluster” at col. 28, line 64), and

finds an object zone corresponding to an object of interest from the first zone-correspondence information and provides at least one or one of combinations of a color histogram, area, image template and color histogram normalized with respect to said area of the object zone as an object characteristic quantity ("label for each connected

component in the merged region cluster, where the label indicates to which region cluster the connected component belongs" at col. 29, line 13; "enhanced set of features for each connected component, that will be used in subsequent stages of the merge corresponder" at col. 29, line 20).

Regarding **claim 8**, Crabtree et al. discloses a device wherein said state-of-tracking deciding means includes an object-zone storing means for storing the object-zone information ("digital information representing each video frame is stored within the memory 135 asynchronously and in parallel with the various processing functions" at col. 4, line 58 which is equivalent to applicant's disclosed storage device),

an object-tracking means (figure 16, numeral 720; "function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for tracking an object based on said object-zone information, the correspondence information that has been determined and the object-zone information prior to the present that is provided from said object-zone storing means ("for each candidate region that is determined to have some overlap (non-zero overlap) with the predicted region cluster, the degree of color match with the predicted region cluster is determined" at col. 27, line 7) and further providing a second zone-correspondence information that indicates the correspondences between objects and object zones ("degree of color match" at col. 27, line 10), and

a state-deciding means (figure 16, numerals 755 and 760; "function performed by a software program or module stored in the memory 135 and executed by the processor

130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for deciding the states of tracking of objects based on said second zone-correspondence information, said object-zone information and said object-zone information prior to the present (“each connected component of the original region cluster is compared with each connected component for each candidate region cluster. Specifically, a confidence value is generated based upon the closeness of the histogram peaks" at col. 27, line 65) and providing said first zone-correspondence information (“final confidence for the region cluster” at col. 28, line 8).

Regarding **claim 9**, Crabtree et al. discloses a device wherein said state-deciding means, based on at least one of or one of the combinations of the correspondences between objects and object zones, distances between object zones and continued periods of separation of said object zones (“confidence value is based upon the degree of overlap and the degree of color matching” at col. 27, line 22), obtained from said second zone-correspondence information and object-zone information, groups the objects that have a common region in their corresponding object zones to sort the objects and corresponding object zones into one class, and sorts the object, which differs in the corresponding object zone from any other objects, and the object zone corresponding thereto into one class to sort the objects and object zones into a plurality of classes (“set of possible candidate region clusters is reduced by removing candidate region clusters that are too far away from the predicted region cluster" at col. 27, line 56), and decides the state of tracking on the basis of the sorted classes (the result of this will determine if the cluster has split or merged).

Regarding **claim 10**, Crabtree et al. discloses a device wherein said state of tracking includes the state of parting that is a transient state through which an object zone parts into a plurality of object zones (“original region cluster has split into several smaller regions” at col. 26, line 17),

said state-deciding means decides that, if two or more object zones are included in a sorted class, then the class meets the condition of being in a state of parting, and that, if a class meets the condition of being in a state of parting, the states of tracking of the objects and object zones included in the class are the state of parting (“generate confidence values for each candidate region in frame n+1, where the confidence value indicates the likelihood that the candidate region came from the original region cluster in the previous frame” at col. 26, line 35; if multiple candidate clusters correspond to the original cluster, it is determined that a split has occurred).

Regarding **claim 11**, Crabtree et al. discloses a device wherein if the sorted class meets the condition of being in the state of parting and if the sorted class meets at least one of or one of the combinations of the conditions that two or more objects are included in said class (“generate confidence values for each candidate region in frame n+1, where the confidence value indicates the likelihood that the candidate region came from the original region cluster in the previous frame” at col. 26, line 35; if multiple candidate clusters correspond to the original cluster, it is determined that a split has occurred), that each of the distances between the object zones included in said class exceeds a predetermined threshold and that continued periods of separation of the object zones included in said class exceed a predetermined threshold, said state-

deciding means decides that the states of tracking of the objects and object zones included in the class are said state of parting.

Regarding **claims 12 and 13**, Crabtree et al. discloses a device wherein said state of tracking includes a state of parting (“original region cluster has split into several smaller regions” at col. 26, line 17) and a stand-alone state in which a single object resides in an object zone (i.e. an unmerged, unsplit cluster that contains valid data that fits into the model of a person), and

if the sorted class includes only one object and if the states of tracking of the object and the object zone included in said class are not the state of parting, then said state-deciding means decides that the states of tracking of the object and the object zone included in said class are the stand-alone state (as stated before, if the object is unsplit and contains characteristics of a person, it can be said that it is a stand-alone; this candidate will also be "too far away from the predicted region cluster" at col. 27, line 57 from a previous merged region for it to be determined that it is a split).

Regarding **claims 14 and 15**, Crabtree et al. discloses a device wherein said state of tracking includes a state of parting (“original region cluster has split into several smaller regions” at col. 26, line 17) and also a crossover state in which a plurality of objects are in corresponding relationship to a single object zone (“original region cluster merges with another region cluster” at col. 26, line 18), and

if a sorted class includes two or more objects and if the states of tracking of the objects and the object zones included in said class are not the state of parting, said state-deciding means decides that the states of tracking of the objects and the object

zones included in said class are the crossover state (a candidate region cluster that overlaps two predicted region clusters and contains a "sufficient amount of overlap to make up a large portion of the original region cluster" at col. 27, line 32 for each cluster is a merge condition).

Regarding **claim 16**, Crabtree et al. discloses a device wherein said characteristic-quantity generating means includes:

a characteristic-quantity extracting means (figure 18, numeral 920, 930; “function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for extracting zone characteristic quantities from the image information, object-zone information and the first zone-correspondence information and providing the zone characteristic-quantity information that is the information indicative of said zone characteristic quantities (“an enhanced set of features, such as color histogram peaks, are extracted for each connected component in the merged region cluster” at col. 29, line 42);

characteristic-quantity storing means (“digital information representing each video frame is stored within the memory 135 asynchronously and in parallel with the various processing functions” at col. 4, line 58, which is equivalent to applicant’s disclosed storage device) for storing object characteristic quantities and selecting the stored object characteristic quantities to supply the selected object characteristic quantities, as required (“An enhanced set of features for each connected component

from frame n+2, that will is used in subsequent stages of the merge corresponder” at col. 30, line 1), and

characteristic-quantity updating means (portion of figure 18, numeral 920 that repeats the merge tracking, which is equivalent to applicant's disclosed program stored in memory) for updating said object characteristic quantities stored in said characteristic-quantity storing means based on said zone characteristic-quantity information, said first zone-correspondence information or correspondence information that has been determined and the object characteristic quantities generated prior to the present (merge tracking continually updates the histogram values and confidence values for subsequent frames until a split is detected).

Regarding **claim 17**, Crabtree et al. discloses a device wherein

said state of tracking includes the state of parting that is a transient state through which an object zone parts into a plurality of object zones (“split transition” at col. 30, line 19), and

said characteristic-quantity extracting means includes, in zone characteristic-quantity information, the information indicating that there is no need for establishing correspondences to objects for the object zones that represent the states other than the state of parting while in their tracking states (as this module is concerned with split tracking in this stage, it is instructed to focus only on split objects), and

said correspondence-determining means excludes, from the establishment of the corresponding relationship, the object zones indicated in said zone characteristic-quantity information as there is no need to establish corresponding relationship to

objects (as this module is concerned with split tracking in this stage, it is instructed to focus only on split objects; processing changes at the onset of a merge condition).

Regarding **claim 18**, Crabtree et al. discloses a device wherein said state of tracking includes a stand-alone state in which a single object resides in an object zone (i.e. an unmerged, unsplit cluster that contains valid data that fits into the model of a person), and

said characteristic-quantity updating means

decides whether or not the state of tracking of an object is the stand-alone state on the basis of the first zone-correspondence information or the correspondence information that has been determined (as this module is concerned only with split and merge tracking, a stand-alone object would commence to separate processing), and

if the state of tracking of the object is the state other than the stand-alone state, does not update the object characteristic quantities stored in said characteristic-quantity storing means ("output of the merge corresponder 900, is a label for each final region cluster, and a confidence for that label" at col. 30, line 52; features are not updated at this point).

Regarding **claim 19**, Crabtree et al. discloses a device wherein said characteristic-quantity synthesizing means

determines all possible combinations of objects and object zones based on the object characteristic quantities generated by said characteristic-quantity generating means and the first zone-correspondence information ("examines image information for

region clusters (or simply regions) and determines which region clusters have a high likelihood of being an object to be tracked” at col. 16, line 9), and

synthesizes object characteristic quantities only for the determined combinations of objects and object zones to generate synthesized characteristic quantities (“model matcher generates at least one real-world feature for each region cluster” at col. 16, line 14).

Regarding **claim 20**, Crabtree et al. discloses a device wherein characteristic-quantity synthesizing means calculates the synthesis ratios that are coefficients for adjusting the ratios at which the object characteristic quantities are synthesized, and generates synthesized characteristic quantities on the basis of said synthesis ratios and object characteristic quantities (equation at col. 24, line 55; "normalized by the maximum correspondence score and the minimum correspondence score such that the result is within the range of -1.0 to 1.0" at col. 24, line 60).

Regarding **claim 21**, Crabtree et al. discloses a device wherein said characteristic-quantity synthesizing means receives zone characteristic quantities as well as object characteristic quantities from the characteristic-quantity generating means, calculates synthesized characteristic quantities depending on desired synthesis ratios on the basis of the received zone characteristic-quantity information and object characteristic quantities ("normalized by the maximum correspondence score and the minimum correspondence score such that the result is within the range of -1.0 to 1.0" at col. 24, line 60), and provides the synthesized characteristic quantity for the synthesis ratio that yields the highest of all degrees of similarity between the calculated

synthesized characteristic quantities and the zone characteristic quantities (“Correspondence scores which are less than 0 will cause the OCGM 300 not to link a new node to an existing node, whereas all other correspondence scores will cause a link to be added and considered for further processing” at col. 24, line 66).

Regarding **claim 22**, Crabtree et al. discloses a device wherein said state of tracking includes a state of parting that is a transient state through which an object zone parts into a plurality of object zones (“split tracks” at col. 15, line 21), and

said characteristic-quantity synthesizing means generates synthesized characteristic quantities only for the object zones that are indicated as having the state of parting as their states of tracking (“New OCG tracks are created for each node in the current frame and linked to the corresponding TCG tracks" at col. 15, line 21).

Regarding **claim 23**, Crabtree et al. discloses a device wherein said object characteristic quantity includes an area of an object (the clusters are resegmented accordingly to create the connected components, which includes an area of the object), and

said characteristic-quantity synthesizing means calculates the synthesis ratios that are coefficients for adjusting the ratios at which the object characteristic quantities are synthesized on the basis of the areas of objects included in said object characteristic quantities and generates synthesized characteristic quantities from said synthesis ratios and said object characteristic quantities ("normalized by the maximum correspondence score and the minimum correspondence score such that the result is within the range of -1.0 to 1.0" at col. 24, line 60).

Regarding **claim 24**, Crabtree et al. discloses a device wherein said characteristic-quantity synthesizing means limits the synthesis ratios within a predetermined range on the basis of the variations in the areas of objects ("normalized by the maximum correspondence score and the minimum correspondence score such that the result is within the range of -1.0 to 1.0" at col. 24, line 60, which depends accordingly on the variations between the corresponding object areas).

Regarding **claim 25**, Crabtree et al. discloses a device wherein said characteristic-quantity synthesizing means receives zone characteristic quantities together with object characteristic quantities from the characteristic-quantity generating means, calculates synthesized characteristic quantities within the range of the variations in the areas of objects based on the received zone characteristic quantities and object characteristic quantities, and provides the synthesized characteristic quantities that have the highest degrees of similarity to the zone characteristic quantities of the object zones of interest ("utilizes region features to compare region clusters and generates a correspondence score for each comparison that represents the likelihood that two region clusters match" at col. 19, line 2).

Regarding **claim 26**, Crabtree et al. discloses a device wherein said object characteristic quantity includes an image template representative of the shape and color of an object ("object model information or data, for a person" at col. 16, line 48; "Skin color may be useful alone, or in combination with size and location information of a region cluster" at col. 18, line 61), and

said characteristic-quantity synthesizing means decides the back-to-belly relation of each of the objects from the image templates and zone characteristic quantities and obtains the synthesized characteristic quantities by synthesizing the image templates based on the respective decided back-to-belly relations of said objects ("width of each object in real-world scale is determined" at col. 17, line 59; "output of the model matcher 600 includes real-world X and Y coordinates for a region cluster, real-world heights and widths, a confidence value indicating whether the region cluster is a particular object" at col. 18, line 55).

Regarding **claim 27**, Crabtree et al. discloses a device wherein said correspondence-determining means is provided with

a correspondence-calculating means (figure 17, numeral 900; function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for calculating the combination of objects and object zones which have the highest similarity from all the possible combinations of the objects and object zones that are possibly associated in corresponding relationship based on said synthesized characteristic-quantity information, said zone characteristic-quantity information and said first zone-correspondence information ("Each connected component from the initial region cluster set is matched to one or more connected component(s) in the merge region cluster based on similarity of features" at col. 29, line 1), selecting the calculated combination of objects and object zones as an optimum combination and generating the optimum-correspondence information that indicates the

optimum corresponding relationship between objects and object zones (“connected components in the merged region cluster are assigned labels indicating which initial region cluster they most closely match” at col. 29, line 7), and

a correspondence-deciding means (figure 17, numeral 900; function performed by a software program or module stored in the memory 135 and executed by the processor 130" at col. 4, line 65, which is equivalent to applicant's disclosed program stored in memory) for determining the corresponding relationship between objects and object zones on the basis of said first zone-correspondence information and said optimum-correspondence information and providing the correspondence information that has been determined that is the information that includes the corresponding relationship that has been decided between objects and object zones (“feature enhanced connected components, their assigned labels and confidences are returned" at col. 29, line 10).

Regarding **claim 28**, Crabtree et al. discloses a device wherein said correspondence-calculating means calculates a total degree of similarity for each of all the possible combinations of objects and object zones, said total degree of similarity being a sum of the degrees of similarity between the characteristic quantities of object zones and synthesized characteristic quantities within each combination, and decides the combination that has the highest similarity based on the combination having the highest, total degree of similarity, of said all the possible combinations (“connected components in the merged region cluster are assigned labels indicating which initial region cluster they most closely match” at col. 29, line 7).

Regarding **claim 29**, Crabtree et al. discloses a device wherein said first zone-correspondence information includes the information about an at-rest/in-motion state that indicates whether an object zone is at rest or in motion, and said correspondence-calculating means excludes the combination of the object and object zone that is indicated as being at rest in said information about an at-rest/in-motion state from said all possible combinations (“tracks which have a most recent OCG node that is older than a predetermined maximum period of time, called MaxDeadTime, are designated as “dead” tracks” at col. 10, line 48, which indicate information about it is at rest).

Regarding **claims 30 and 31**, Crabtree et al. discloses a device wherein if degrees of combined similarity that can be obtained from the degrees of similarity of sets of the objects and object zones, said sets of the objects and object zones making up the combinations decided to be ranked as the highest similarity, are equal to or lower than a predetermined threshold (“predetermined threshold” at col. 28, line 10), then said correspondence-calculating means selects the combinations of the degrees of combined similarity within said predetermined threshold, from the combinations of the degrees of combined similarity ranked as the highest similarity of all possible combinations of objects and object zones, includes the corresponding relationship of objects and object zones common to the selected combinations, into the optimum-correspondence information as optimum correspondences (“confidence values generated for each candidate region cluster in step 760 are returned to the OCGM 300” at col. 28, line 11, which are further processed by figure 18, numeral 900 if deemed to contain a merge), and further, for the objects and object zones having the

corresponding relationship that are not included in said corresponding relationship of the object and object zone common to said selected combinations, includes the information indicating that there are no optimum correspondence between the objects and object zones, into the optimum-correspondence information (“If no candidate region cluster has a sufficient confidence, then the position overlap method is executed” at col. 28, line 15),

for the objects not indicated as having no optimum corresponding relationship to any object zones in said optimum-correspondence information, said correspondence-deciding means provides the information indicating the corresponding relationship of objects and object zones included in said optimum-correspondence information as the correspondence information that has been determined (“These confidence values are then used by the OCGM 300 to determine the links between nodes in frames n and n+1” at col. 28, line 12, which is processed by figure 18, numeral 910 for a merge), and

for the objects indicated as having no optimum corresponding relationship to any object zones in said optimum-correspondence information, said correspondence-deciding means provides the information indicating the corresponding relationship of objects and object zones included in said first zone-correspondence information as the correspondence information that has been determined (“final confidence for each candidate region cluster is obtained by scaling its current confidence score by the minimum of the total number of pixels in the original region cluster and the candidate region cluster" at col. 28, line 22).

Regarding **claim 32**, Crabtree et al. discloses a device wherein said state of tracking includes a state of parting that is a transient state through which an object zone parts into a plurality of object zones (“split tracks” at col. 15, line 21), and

said correspondence-deciding means determines the corresponding relationship between objects and object zones to be indicated in the optimum-correspondence information only for the object zones that exhibit a state of parting as their states of tracking (figure 18, numeral 930).

Regarding **claim 34**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 1 rejection above.

Regarding **claim 35**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 2 rejection above.

Regarding **claim 36**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 3 rejection above.

Regarding **claim 37**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 4 rejection above.

Regarding **claim 38**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 5 rejection above.

Regarding **claim 39**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 6 rejection above.

Regarding **claim 40**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 7 rejection above.

Regarding **claim 41**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 8 rejection above.

Regarding **claim 42**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 9 rejection above.

Regarding **claim 43**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 10 rejection above.

Regarding **claim 44**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 11 rejection above.

Regarding **claim 45**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 12 rejection above.

Regarding **claim 46**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 13 rejection above.

Regarding **claim 47**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 14 rejection above.

Regarding **claim 48**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 15 rejection above.

Regarding **claim 49**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 16 rejection above.

Regarding **claim 50**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 17 rejection above.

Regarding **claim 51**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 18 rejection above.

Regarding **claim 52**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 19 rejection above.

Regarding **claim 53**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 20 rejection above.

Regarding **claim 54**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 21 rejection above.

Regarding **claim 55**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 22 rejection above.

Regarding **claim 56**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 23 rejection above.

Regarding **claim 57**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 24 rejection above.

Regarding **claim 58**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 25 rejection above.

Regarding **claim 59**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 26 rejection above.

Regarding **claim 60**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 27 rejection above.

Regarding **claim 61**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 28 rejection above.

Regarding **claim 62**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 29 rejection above.

Regarding **claim 63**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 30 rejection above.

Regarding **claim 64**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 31 rejection above.

Regarding **claim 65**, Crabtree et al. discloses a method for tracking an object based on image information as executed by the device described in the claim 32 rejection above.

Regarding **claim 67**, Crabtree et al. discloses an object-tracking program for tracking an object based on image information, said program operating a computer to execute the processes of the device described in the claim 1 rejection above.

Regarding **claim 68**, Crabtree et al. discloses an object-tracking program for establishing correspondences between objects and object zones included in received image information, said program operating a computer to execute the processes of the device described in the rejections of claims 1-4 above.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATRINA FUJITA whose telephone number is (571)270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Katrina Fujita/
Examiner, Art Unit 2624

/Vikkram Bali/
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